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The Kierstead's Conjecture and limitwise monotonic functions

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ABSTRACT

In this paper, we prove Kierstead's conjecture for linear orders whose order types are $\sum_{q\in\mathbb{Q}} F(q)$, where F is an extended $0'$-limitwise monotonic function, i.e. F can take value ζ. Linear orders in our consideration can have finite and infinite blocks simultaneously, and in this sense our result subsumes a recent result of C. Harris, K. Lee and S.B. Cooper, where only those linear orders with finite blocks are considered. Our result also covers one case of R. Downey and M. Moses' work, i.e. $\zeta \cdot \eta$. It covers some instances not being considered in both previous works mentioned above, such as $m \cdot \eta + \zeta \cdot \eta + n \cdot \eta$, for example, where $m, n > 0$.

1. Introduction

In this paper, we make progress toward solving a long-standing open problem of characterizing the order types of Π^0_1-rigid computable linear orders (a linear order is Π^0_1-rigid if it does not have any nontrivial Π^0_1-automorphism). Downey's survey paper [1] provides an extensive motivation and research toward this problem. As usual, ω, ζ, η are the order types of natural, integers and rational numbers, respectively. Moreover, $\mathbb{N}, \mathbb{Q}$ are the set of natural numbers and the set of rational numbers, correspondingly. By technical reasons, we assume that $\mathbb{N}$ does not contain 0.

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